Vascular Interventional Neuroradiology in a Country with a Small and Scattered Population

Twenty Years' Experience in Norway

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Summary

Experience with neuroradiological endovascular therapy in a small country is presented. Five Norwegian university hospitals are currently performing coiling of cerebral aneurysms and three are embolizing cerebral arteriovenous malformations. The small number of procedures in most of these institutions may threaten the quality of treatment, education of neuroinradiologists, research and scientific work in this field. An even greater concern might arise in the field of neurosurgery after the reduction in surgical procedures following the increasing takeover by endovascular procedures. The safety during transportation of patients with subarachnoid hemorrhage has been debated and is considered by some as a problem, but earlier experience from Nordic countries does not support this concern.

Reducing the number of centres performing these procedures seems necessary to obtain adequate patient safety and an ethical practice.

Introduction

Inspired by the development within interventional neuroradiology in France and the USA interventional treatment of cerebral arteriovenous malformations was started in Oslo in1986. In 1992 we were invited together with a dozen other university hospitals in Europe to participate in the first international clinical trial with coiling of cerebral aneurysms. Today aneurysmal coiling is by far the largest activity of endovascular neuroradiology in our country.

During the first seven years endovascular therapy in cerebral aneurysms was kept within a small group at the University of Oslo. During these years we served the other four university hospitals in Norway and Iceland with interventional procedures.

In 1998 the other university hospitals in Norway approached the authorities to obtain permission to establish interventional neuroradiology at their hospitals. At that time the Oslo group argued against this since the volume of patients in our 4.5 million population seemed too small for more than one centre. Another of our arguments was that an excellent ambulance transport service with helicopters and airplanes already existed.

The same arguments against dividing neuroradiological intervention between multiple hospitals were forwarded without success in Sweden by the Gothenburg group. The arguments against centralisation were that every neurosurgical unit needed interventional neuroradiology on place and that transporting patients with subarachnoid hemorrhage (SAH) was dangerous. This argument was met by the fact that the transportation after stabilizing SAH patents so far in Norway and Sweden had not shown any complications.

The health department decided finally that every university hospital with regional responsibility for neurosurgery was entitled to do coiling of cerebral aneurysms. Endovascular treatment of cerebral and spinal arteriovenous malformations (AVM) and fistulas (AVF) should be maintained exclusively in Oslo by the two university hospitals there.

Present State of Activity

During the last years all five regional university hospitals in Norway have established coiling of cerebral aneurysms. The decision to treat AVMs exclusively in Oslo has not been fully followed. Of the five university hospitals in Norway only three hospitals, two in Oslo and one in Bergen, serve populations of approximately one million people (Ullevål University Hospital 1.6 million, Rikshospitalet 1.0 million and Haukeland University Hospital in Bergen 0.9 million). The other university hospitals have population bases between 650.000 and 250.000 people respectively.

Since SAH is a rare condition the relatively small numbers of neuroradiological interventional procedures in our institutions should not be surprising to anyone, even if the overall distribution between neurosurgical and interventional treatment is in favour of interventional neuroradiology. Approximately 60% of all admitted spontaneous SAH cases are coiled, while 85 % of all AVMs are embolized, usually as a risk reducing preoperative cure [1].

In later years stenting procedures have increasingly been performed, mainly in the precerebral arteries, but still with relatively low numbers (50-75 per year).

Patient numbers: Altogether only three institutions perform more than 100 procedures per year and none more than 250. The two hospitals with the smallest numbers are performing fewer than 30 procedures.

Performing neuroradiologists: Only the two hospitals in Oslo have teams with three or more active interventionists, one has two and two institutions have only one.

24 hour service: Only the two institutions in Oslo have a formalised 24 hour service, while the other hospitals are practising service on a "service if possible" basis. Consequently, if no interventionalist is reachable, three institutions either have an agreement with other hospitals or the patients go to neurosurgery during holidays and weekends.

Publication of scientific papers: Publishing of scientific papers in international and Norwegian peer review journals has been limited to the two largest institutions in Oslo [1-17]. Scientific publishing in cooperation with international institutions has been limited to these two hospitals as well [16-17].

Discussion

Interventional neuroradiology has been a major event in treatment for neurovascular diseased patients, especially since the introduction of coiling of cerebral aneurysms [18]. During the last decade many reports on techniques, equipment, short time results, follow-up and even comparative studies [19] have been published. There is no doubt that the method has been beneficial for most of the treated patients and many patients have been "saved" from surgery with its higher risk and morbidity [19]. Some publications have discussed learning aspects, teaching and ethics [20,21].

Professional societies and congresses have from time to time discussed these topics in a serious way, e.g. the European Society of Neuroradiology (ESNR) and the World Federation of Interventional and Therapeutic Neuroradiology (WFITN)[22]. These societies have suggested that a teaching department should have at least 200 procedures. Lower numbers are probably sufficient concerning training, indications and ethics for those who already master the field, but it is a sharp edge to balance along. Is it right to offer patients these complicated and potentially dangerous treatment options if you work with marginally low patient numbers? A serious problem will be teaching younger colleagues and recruiting the right colleagues for this activity.

Institutions that produce few or no scientific papers in this field may give a signal of low quality of their work. Being scientifically active even with small numbers of cases is probably important to maintain adequate qualifications. There are of course other ways to evaluate your own working procedures, but producing papers for peer review journals seems to be one of the best possible ways.

It might be difficult to transfer our experience to other countries with denser populations and shorter transportation distances favouring the establishment of larger centres. However, in my opinion transportation of stabilised SAH patients seems to be less of a problem than admitting patients to institutions where volume and experience in treatment and follow-up is marginal. In many cases the transportation distances of SAH patients are in any case relatively long in Norway. There are many small airports all over the country and helicopters dedicated to patient transportation around the clock transporting severe traffic accident victims over long distances, e.g. to the acute trauma centre in Oslo.

Another significant problem is arising with regard to neurosurgical training and maintaining operative skill when neuroradiological interventions have reduced the number of patients going to surgery by more than 50%.

Two larger institutions, one in Oslo and one in Northern Norway would be ideal for serving SAH patients. Transportation of cerebral AVMs and AVFs is not a problem since they almost without exception are treated as non acute cases. Spinal AVMs represent a very low number of patients, and a permanent collaboration with larger international institutions abroad should be discussed to secure the best possible treatment for these relatively rare cases.

The unfortunate situation with five centres treating patients for acute and chronic cerebrovascular diseases in Norway has been driven forward by the ambitions of smaller neurosurgical departments and health politicians. The establishment of health regions, the smallest with a population basis of fewer than 300.000 people, comprising all medical specialities, seems unfortunate with regard to the quality of treating relatively rare diseases.

It is frustrating to see that the many important recommendations and considerations in patients' interest [20-27] have been neglected, at least in our country. In my opinion the risk that non-medical administrative bodies will control accreditation, and act on economic and administrative basis in the development of interventional neuroradiology has become true [26]. Lately one of the leading administrators at one of the smallest university hospitals in Norway proposed that general radiologists working with interventional procedures in organs other than the brain, could take over the cerebral interventions as well. The argument was the lack of educated neuroradiologists in their hospital. The well documented complexity [28] and small numbers of neuroradiological procedures in their own country was not considered [1-17].

Conclusions

The spread of interventional procedures in many small units in Norway is not in agreement with the standards recommended by the leading societies and colleagues in this field. Ambitions from administrators and some colleagues, mainly clinicians, have been the driving forces in this unfortunate development.

Two larger centres for cerebral endovascular procedures and neurosurgery could just maintain an adequate volume to keep up the necessary quality of treatment, ethics, education and training of younger and older neuroradiologists and neurosurgeons. An endovascular therapeutic activity should not be allowed unless a 24 hour service offering cerebral endovascular treatment with adequate numbers of cases is established. It seems to be a fair recommendation for any country to avoid establishing cerebrovascular units serving populations smaller than two million people. With regard to acute SAH this would mean that the number of admitted cases would exceed 250 patients per year which may be needed to maintain an ethically defendable activity in interventional cerebrovascular diseases.

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